

# Methods for the Spatial Analysis of Community Wellbeing, Resilience and Vulnerability

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## Abstract

This paper proposes an approach for targeting priority areas for community engagement using data held by local authorities relating to local taxation, housing, education, public health outcomes and derived measures of vulnerability. It seeks to identify the relevant variables that are held by the local authority, to model community or neighbourhood trajectories by examining changes in such data over time as the first steps in a hierarchical approach for analysing community resilience and well-being. The outputs of these steps allow community engagement activities to be targeted. Initial results are described and key discussion points are outlined.

*Keywords:* Spatial Analysis, GIS, Mixed Methods, Community Engagement

## 1 Introduction

The concepts of community Resilience and Wellbeing are important for developing / promoting sustainable communities. Research on 'wellbeing' has historically focused on the importance of personal factors (e.g. family relationships, financial situation, health, friends, work, freedom and values). It has sought to explore the links between biological, psychological and socio-cultural factors that enable some individuals to successfully manage changes to their environment but not others. Other, less well developed research has shown that community level factors are also important [1] and that analysis of community-level well-being and resilience may be more important [2], and that neighbourhood spatial factors are critical [3].

The concept of community resilience is grounded in the links between competence, adversity and wider interactions and defines resilience primarily in terms of how people relate to and interact with family and the wider social environment, alongside their individual characteristics [4].

Resilience and wellbeing are linked and positive feelings of wellbeing associated with resilience have been found to result in greater feelings of wellbeing [5]. At a community level concepts of community / neighbourhood wellbeing and resilience includes social capital and structural features, where social capital describes relationships and levels of support [6] and structural features include transport links, proximity and equity of services (primary schools, GP surgeries and local hospitals) and community facilities.

The aim of this paper is to present a method for the exploration of the extent to which initial measures of community well-being and resilience can be generated through the spatial analysis of data held at a local government level. Data is assembled for Leicester, a city in the English midlands. In social sciences, traditional methods for measuring reliance and wellbeing (at either the community or the individual level) focus on surveying representative

samples of the population, using questionnaires. In this research, a hierarchical methodology is described, where indicators of the spatial distribution of different levels of community well-being are identified as a first stage in the analysis, subsequent time series data are used to model community trajectories and to target the location of community engagement activities to finesse the assessments of community wellbeing and resilience.

## 2 Background

There is much interest in developing approaches for identifying communities that may be vulnerable to decreased levels in local government services. Of particular interest is desire to identify and quantify population 'assets' (community resilience, social capital) and the impacts of recent changes in the cost of living. Additionally there is a need to develop temporally dynamic measures of community wellbeing and resilience in order to quantify trajectories of communities associated with different types of vulnerability. In the longer term, the local authority would like to develop sustainable mechanisms for increasing community engagement in order to improve the funding, planning and delivery of local services.

Tobin (1999) presents a conceptual framework for analysing community sustainability and resilience based on three theoretical models (mitigation, recovery model and structural-cognitive aspects) [7]. This area of research has been extensively explored within the context of resilience to natural disasters and environmental hazards (for example, [8-9]). However, the concepts of community well-being and resilience have evolved recently to include approaches for measuring the level socio-economic disenfranchisement such as the Wellbeing and Resilience Measure (WARM) framework for measuring wellbeing and resilience at a local level [10]. Such approaches involve extensive questionnaire surveys and interviews in order to determine levels of



feedback into the GIS analysis, the design of data collection and analysis. It will also be used to inform approaches for community engagement based around different forms of new media engagement. The integration of new media for data collection and community engagement (e.g. via SMS message) offers new opportunities (especially with location enabled smart phones).

## 5 Summary

This short paper described an outline methodology for measuring community well-being and resilience that is novel, evolutionary, ongoing and iterative. It uses the analysis of spatial data to develop an initial stratification of neighbourhoods, but then uses community engagement to finesse and refine the data collection and the analysis. The purpose of this iterative process is to ensure the relevancy of the data that is captured (are the right questions being asked?, are questions being asked that existing data do not answer?), to increase community ownership of the survey (are the technical approaches to gathering and representing data relevant?) and to enhance the community involvement in the policy process

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Figure 1: Vulnerability distributions.



Figure 2: Spatial distribution of Community Resilience proxies

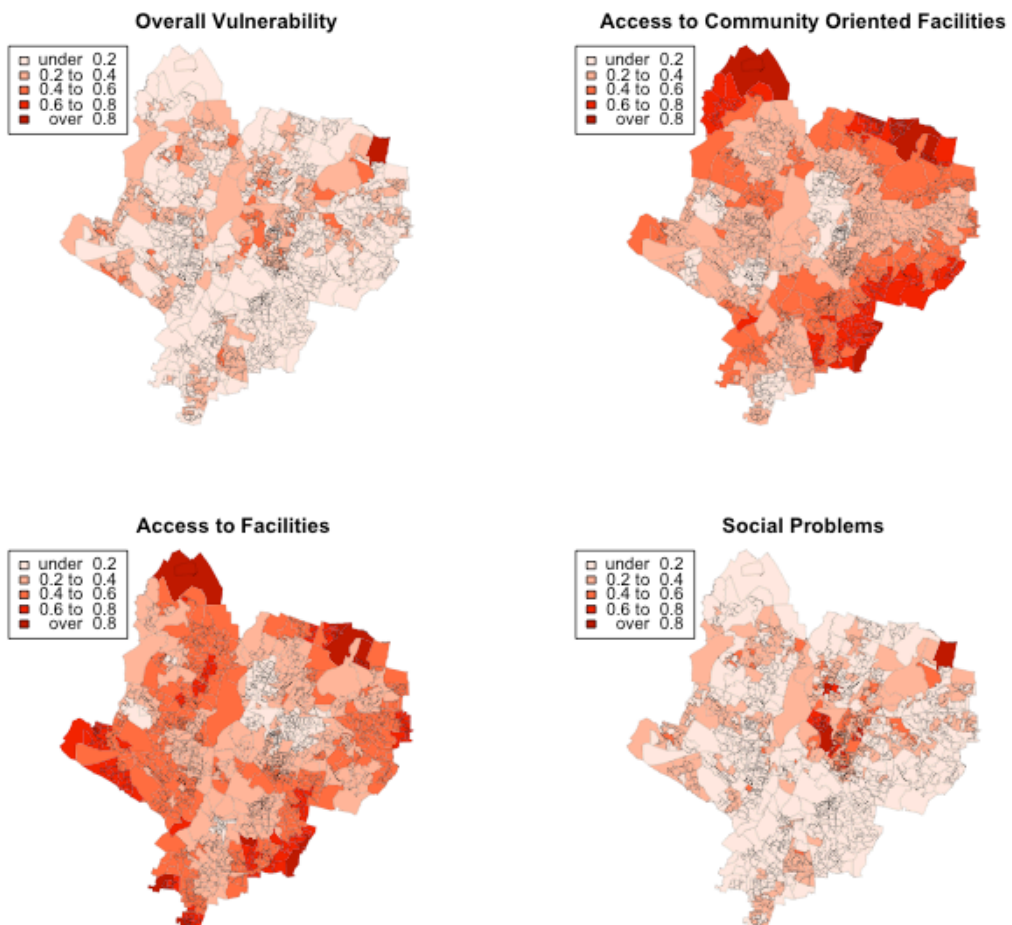


Figure 1: Resilience, Vulnerability and wellbeing scores for Neighbourhoods in Leicester

	Income	Property	Disability	Overcrowding	Claimant	Medical	IMD	KS4_11	Children Centre	Schools	Youth Centre	Leisure Centre	Post Office	Library	PCT	Community Centre	Training Centre	Local Greenspace
South Knighton	Green	Green	Green	Green	Green	Yellow	Green	Yellow	Red	Red	Red	Red	Red	Red	Yellow	Red	Red	Red
West Knighton	Green	Green	Yellow	Green	Green	Red	Green	Yellow	Red	Red	Yellow	Yellow	Red	Red	Yellow	Red	Red	Red
Braunstone West	Red	Red	Red	Red	Red	Yellow	Red	Green	Green	Yellow	Green	Yellow	Red	Red	Yellow	Green	Yellow	Green
Saffron	Red	Red	Red	Yellow	Red	Red	Red	Yellow	Green	Yellow	Green	Yellow	Yellow	Yellow	Red	Yellow	Red	Yellow
Rushey Mead	Yellow	Green	Yellow	Green	Yellow	Red	Green	Green	Red	Yellow	Red	Red	Red	Yellow	Yellow	Yellow	Red	Yellow
Beaumont Leys	Red	Red	Yellow	Red	Red	Green	Red	Red	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Yellow
Northfields	Red	Red	Yellow	Yellow	Red	Red	Yellow	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Yellow	Red	Red
Netherhall/Thurnby Lodge	Yellow	Yellow	Yellow	Green	Yellow	Red	Yellow	Yellow	Green	Yellow	Green	Red	Red	Red	Yellow	Yellow	Red	Yellow
Castle Hill	Green	Green	Yellow	Green	Green	Green	Green	Yellow	Red	Yellow	Red	Yellow	Yellow	Yellow	Red	Red	Red	Yellow
St Matthews & St Peters	Red	Red	Red	Red	Red	Green	Red	Red	Green	Green	Yellow	Yellow	Yellow	Green	Green	Green	Green	Yellow
Abbey	Green	Green	Yellow	Yellow	Yellow	Yellow	Green	Green	Red	Yellow	Yellow	Yellow	Yellow	Red	Red	Red	Red	Yellow
Evington	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Green	Red	Yellow	Red	Green	Yellow	Yellow	Yellow	Red	Red	Red	Yellow
Mowmacre/Stocking Fm	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Red	Red	Yellow	Yellow	Yellow	Red	Red	Red	Yellow	Green	Yellow	Yellow
New Parks East	Red	Yellow	Red	Yellow	Yellow	Red	Red	Red	Yellow	Yellow	Yellow	Yellow	Red	Yellow	Yellow	Green	Yellow	Yellow
Stoneygate	Yellow	Yellow	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Red	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Red	Yellow	Yellow
Latimer North	Yellow	Red	Red	Red	Yellow	Yellow	Green	Yellow	Yellow	Green	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Red
City Centre/St Andrews	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Red	Yellow	Red	Green	Yellow	Red	Yellow	Green	Green	Green	Yellow
Humberstone	Green	Yellow	Yellow	Green	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Yellow	Yellow	Red	Green	Yellow	Red
Spinney Hill	Yellow	Red	Yellow	Red	Red	Yellow	Green	Yellow	Yellow	Yellow	Red	Yellow	Yellow	Green	Green	Yellow	Yellow	Green
Hamilton	Yellow	Yellow	Green	Green	Green	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Red	Red	Yellow	Yellow	Yellow	Yellow	Red
Latimer South	Yellow	Yellow	Yellow	Red	Red	Yellow	Yellow	Yellow	Green	Yellow	Green	Green	Yellow	Yellow	Yellow	Green	Yellow	Red
Aylestone	Green	Green	Yellow	Green	Green	Green	Green	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Yellow	Red	Red
Clarendon Park	Green	Yellow	Green	Green	Green	Green	Green	Red	Red	Yellow	Red	Yellow	Yellow	Green	Yellow	Red	Yellow	Yellow
New Parks West	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Yellow	Yellow	Yellow	Red	Yellow	Yellow	Yellow	Red	Yellow	Yellow	Yellow	Yellow
Newfoundpool	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Yellow	Yellow	Yellow	Red	Yellow	Yellow	Green	Yellow	Yellow
Eyres Monsell	Yellow	Yellow	Yellow	Green	Yellow	Yellow	Green	Green	Yellow	Yellow	Green	Red	Yellow	Yellow	Yellow	Yellow	Red	Yellow
St Saviours	Yellow	Yellow	Yellow	Red	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Red	Green	Green	Yellow	Yellow	Yellow	Yellow	Yellow
Aylestone Park	Yellow	Yellow	Yellow	Green	Yellow	Yellow	Red	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Red	Red	Red	Yellow
Charnwood	Yellow	Red	Yellow	Red	Red	Yellow	Green	Green	Green	Yellow	Yellow	Green	Yellow	Yellow	Green	Yellow	Green	Yellow
Braunstone East	Yellow	Yellow	Yellow	Green	Yellow	Yellow	Red	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Red	Green	Green	Green	Yellow
Rushey Fields	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Green
Crown Hills	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Yellow	Green	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Green	Yellow	Yellow
Belgrave	Yellow	Red	Yellow	Red	Yellow	Green	Red	Red	Yellow	Yellow	Yellow	Green	Yellow	Green	Yellow	Green	Green	Yellow
Rowley Fields	Yellow	Green	Yellow	Green	Green	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Green	Yellow	Yellow	Yellow	Yellow	Yellow
West End	Yellow	Yellow	Yellow	Green	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Green	Yellow	Yellow	Green	Green	Yellow	Yellow	Yellow
Western Park	Green	Green	Green	Green	Green	Red	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow